

**REMARKS**

Claims 1-15 are pending in this application, and claims 9-11 and 15 are withdrawn from consideration. By this Amendment, claims 1 and 2 are amended. No new matter is added by this Amendment. Support for the language added to claims 1 and 2 can be found throughout the specification, for example in paragraph [0015].

I. **Restriction Requirement And Rejoinder**

Applicant affirms election of Group I, claims 1-8 and 12-14, with traverse.

However, Applicant disagrees that the present application includes three independent inventions. Claims 1-8 and 12-14 (Group I) are directed to a new method for making novel fibers (Group II) and novel films (Group III). The novel fibers and films exhibit improved properties, such as improved modulus and tensile strength. These improved properties are the direct result of the method of making such fibers and films.

The single inventive concept may be found in the method recited in claims 1-8 and 12-14 (Group I), which results in the fibers (Group II) and films (Group III) having improved modulus and tensile strength. Further, contrary to the Patent Office's allegations, and addressed fully below, method claims 1-8 and 12-14 (Group I) are patentable over the disclosures of U.S. Patent No. 5,273,703 to Alexander et al. and U.S. Patent No. 5,445,779 to Pierini et al.

For at least the foregoing reasons, Applicant submits that upon allowance of elected claims 1-8 and 12-14, withdrawn claims 9-11 and 15 should be rejoined and similarly allowed.

Thus, withdrawal of the Restriction Requirement is respectfully requested.

II. **Rejection Under 35 U.S.C. §102(b)**

Claims 1-4, 6, 7, 12 and 14 were rejected under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Patent No. 5,445,779 ("Pierini"). This rejection is respectfully traversed.

The Patent Office alleges that Pierini describes all of the features recited in claims 1-4, 6, 7, 12 and 14. Specifically, the Patent Office alleges that Pierini describes a process of making a film from an aromatic heterocyclic polymer including the steps of forming a film, loading in the presence of a processing aid, and removing the processing aid and/or heat-treating the film. Applicant disagrees with the Patent Office's allegations that Pierini teaches all of the features of claims 1-4, 6, 7, 12 and 14.

Contrary to the Patent Office's allegations, Pierini does not describe "spinning in a coagulation medium a synthetic organic polymer to an aromatic heterocyclic rod fiber or obtaining the synthetic organic polymer as an aromatic heterocyclic rod film, followed by loading," as recited in the method of claim 1.

Claim 1 requires that loading of the rod fiber or rod film occurs after coagulation, for several reasons.

First, claim 1 recites that the rod fiber is spun in a coagulation medium. The obtained rod fiber is thus coagulated, and it is this coagulated rod fiber that is subjected to the loading. Second, a rod fiber or rod film, to be in rod fiber or rod film form, must have been coagulated. Coagulation is used to form the resultant rod film or rod fiber. Thus, in the process of claim 1, the rod fiber or rod film is subjected to loading after coagulation.

Pierini, on the other hand, does not load/stretch after coagulation, but before. Pierini describes that polybenzazole dope can be cast onto a flat surface to form a film (col. 4, lines 17-41 of Pierini). This dope film is stretched at a temperature of, for example, 100 to 120°C (col. 5, lines 9-27 of Pierini). Pierini describes stretching, drying and heating the film (col. 5, line 38-col. 6, line 21 of Pierini), then coagulating, washing and leaching the stretched film (col. 6, lines 24-54 of Pierini). The washed/leached film can be dried and adjusted by adding stress to the film (col. 6, line 56-col. 7, line 33 of Pierini).

Prior to coagulation occurring, there is only a dissolved polymer, also known as a dope or a polymer stream. Coagulation is performed to form a fiber or film as discussed above. Pierini describes that a "dope film" is stretched, indicating that the stretching occurs before coagulation, and in fact Pierini specifically describes that coagulation occurs after stretching (col. 6, lines 24-25 of Pierini). Thus, Pierini does not describe that loading or stretching occurs after coagulation has formed a rod fiber or rod film as required in claim 1.

For the foregoing reasons, claims 1-4, 6, 7, 12 and 14 are not anticipated by the disclosure of Pierini. Withdrawal of the rejection is thus respectfully requested.

III. Rejections Under 35 U.S.C. §103(a)

A. Pierini In View Of Alexander

Claims 5 and 13 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Pierini in view of U.S. Patent No. 5,273,703 ("Alexander"). This rejection is respectfully traversed.

First, Alexander does not remedy the deficiencies of Pierini. Specifically, Alexander also does not describe "spinning in a coagulation medium a synthetic organic polymer to an aromatic heterocyclic rod fiber or obtaining the synthetic organic polymer as an aromatic heterocyclic rod film, followed by loading," as required in the method of claim 1.

Second, the Patent Office introduces Alexander as allegedly describing the step of treating a fiber with steam. However, like Pierini, Alexander also does not describe treating the coagulated as-spun fiber or the coagulated as-obtained film with a processing aid in the gas or vapor phase, between the loading step and the heating step as required in claim 5 and 13.

Alexander describes that a polymer is dissolved in a solvent such as polyphosphoric acid, and then spun. After spinning, the fiber is coagulated and washed to remove polyphosphoric acid, and then dried. Heat treatment is then applied (col. 5, lines 33-56 of

Alexander). From this description, it is apparent that Alexander uses steam for washing the residual acid, and not treating the as-spun fiber or the as-obtained film with a processing aid in the gas or vapor phase. Alexander also does not describe the use of a loading step at all.

Thus, Alexander does not describe a loading step, and therefore cannot describe treating the as-spun fiber or the as-obtained film with a processing aid in the gas or vapor phase, between the loading step and the heating step that use of steam during a washing step, as in claims 5 and 13.

For the foregoing reasons, claims 5 and 13 are patentable over the disclosures of Pierini and Alexander. Withdrawal of the rejection is thus respectfully requested.

B. Pierini In View Of Alleged Admitted Prior Art

Claim 8 was rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Pierini in view of alleged admitted prior art. This rejection is respectfully traversed.

The Patent Office alleges that Applicant has admitted that PIPD fibers and films are known. However, PIPD fibers and films with a high tensile strength and/or modulus obtained by the process of claim 1, as recited in claim 8, are not admitted prior art.

Moreover, the alleged admitted prior art does not remedy the deficiencies of Pierini. Specifically, the alleged admitted prior art also does not describe "spinning in a coagulation medium a synthetic organic polymer to an aromatic heterocyclic rod fiber or obtaining the synthetic organic polymer as an aromatic heterocyclic rod film, followed by loading," as required in the method of claim 1.

For the foregoing reasons, claim 8 is patentable over the disclosures of Pierini and the alleged admitted prior art. Withdrawal of the rejection is thus respectfully requested.

C. Allen In View Of Pierini

Claims 1-4, 6, 7, 12 and 14 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over EP 0 384 425 ("Allen") in view of Pierini. This rejection is respectfully traversed.

The Patent Office alleges that Allen describes a process of making a fiber by the process of claim 1, except that Allen does not explicitly teach aromatic heterocyclic polymers. The Patent Office thus introduces Pierini as teaching this feature. Applicant disagrees with the Patent Office's allegation that the process of the present claims is obvious over the teachings of Allen and Pierini.

First, Allen is not related to heterocyclic rigid rod polymers, but to p-aramid polymers. Chemically, p-aramid fibers are unrelated to the rigid rod polymers, e.g., PIPD, of the present claims. The Patent Office's allegation that the polymers of the present claims are similar, and would provide the same results, as the p-aramid polymers of Allen is incorrect. One of ordinary skill in the art would not have concluded to utilize the teachings of Allen, directed to p-aramid polymers, when making polybenzazole fibers, as in Pierini, even if both are used in high modulus, high tenacity fibers.

Chemical differences exist between polybenzazole and p-aramid, and one of ordinary skill in the art would understand that one material is not a substitute for the other. P-aramid is spun from sulfuric acid dopes, which have a solvent that can be easily removed by washing, whereas the rigid rod polymers of the present claims cannot be spun from sulfuric acid and in practice can only be obtained from polyphosphoric acid dopes. This polyphosphoric acid cannot be completely removed (see col. 6, lines 30-34 of Pierini and col. 4, lines 40-57 of Alexander).

Further, due to the chemical differences between polybenzazole and p-aramid, PIPD forms a hydrate when spun, whereas p-aramid does not form such a hydrate. The presence of

hydrated water in rigid rod polymers leads to different effects than for p-aramid, even when applying similar process steps.

Thus, contrary to the Patent Office's allegations, one of ordinary skill in the art would not have substituted the p-aramid of Allen with aromatic heterocyclic polymers of Pierini.

Moreover, contrary to the Patent Office's allegations, the effects described in Allen are different from the improved results of the process of claims 1-4, 6, 7, 12 and 14. Allen discloses improved modulus and tenacity, but these "improvements" are of a different order than the improvements achieved by the claimed process. For example, Allen's improvement regarding tenacity amounts to a meager 4-7.7% (see page 6, Table 1 of Allen), while the fibers produced according to the process of claim 1 compared to as-spun fibers demonstrate an improved tenacity of 22-43% (see the Table on page 6 of the present specification).

Even considering the disclosure of Allen, the improvements achieved by the process of claims 1-4, 6, 7, 12 and 14 are unexpected. Thus, even if Allen and Pierini were to have been combined as alleged by the Patent Office, the process for obtaining the fibers and films with high tensile strength and/or modulus recited in claim 1 would not have been achieved.

For the foregoing reasons, claims 1-4, 6, 7, 12 and 14 are patentable over the disclosures of Allen and Pierini. Withdrawal of the rejection is thus respectfully requested.

D. Allen In Combination With Pierini And Further In View Of Alexander

Claims 5 and 13 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Allen in combination with Pierini, and further in view of Alexander. This rejection is respectfully traversed.

Alexander is introduced as allegedly describing treating the coagulated as-spun fiber or the coagulated as-obtained film with a processing aid in the gas or vapor phase, between the loading step and the heating step as required in claim 5 and 13. However, as explained above, Alexander describes using steam for washing residual acid, and not treating the as-

spun fiber or the as-obtained film with a processing aid in the gas or vapor phase. Thus, Alexander does not remedy the deficiencies of Allen and/or Pierini.

For the foregoing reasons, claims 5 and 13 are patentable over the disclosures of Allen, Pierini and Alexander. Withdrawal of the rejection is thus respectfully requested.

IV. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-15 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

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